

The Culture of a Machine Crafted Architecture: The First Tournalaid Communities

EVERETT HENDERSON, JR.
University of Florida



Figure 1. Tournalayer No. 2 in Longview, Texas 1946. Top images shows the inner form to the left and the lower image shows the outer form being lowered over the inner. Image courtesy of the LeTourneau University Archives.

THE EVOLUTION OF THE DESIGN OF THE HOUSES AND COMMUNITIES

Robert Gilmore "R.G." LeTourneau was an industrialist at the beginning of the 20th century; he is best remembered for producing revolutionary earth moving equipment. While his education was not ac-

ademic, it was achieved through real-world experience. His early experiences as a mold-maker, lead pourer, land-clearer and auto mechanic established his philosophy towards craft. While he held over 300 patents, his interest was not solely in the patent but rather newer and faster ways to work; he was often quoted as saying "work faster, not harder." Experimentation and invention were constant with LeTourneau and he was not afraid of failure; only a small percentage of his machines worked as intended, but the ones that did – worked well.

Ultimately, LeTourneau was a craftsman who used his knowledge of earth moving equipment to create several housing systems that established communities across America.¹ LeTourneau's ideas on how to create new techniques for production and new forms of housing constantly evolved from the mid 1930s until the mid 1960s and now serve as a point of reflection for architects to consider how this machine crafted home might provide hope for future prefabricated communities.

R.G. LeTourneau's first steel housing system and community design was in Peoria, Illinois in 1936. Embossed pressed steel panels were welded together to form the structural skin. Panels were used as the inner and outer skin to form the walls, roof and floor; the inner and outer panels were held apart with cross bracing and filled with insulation. The community was called the "All Steel Colony"² and was a worker housing development that LeTourneau named LeTourneau Court; the twenty-three 3-4 room houses were air conditioned and romantically referred to as "The Garden City of Tomorrow."³ The architect who worked with Le-

Tourneau designed the houses with flat roofs, steel floors, corner windows, air conditioning and an occupiable roof deck.⁴

The houses were sited to face each other so as to enclose a central pedestrian circulation space. This house system would later be marketed as dust-proof, termite-proof and carefree. There were plans to exhibit the "Compact five-room for speedy age" house at the Golden Gate Exposition in San Francisco in 1939 although the plans never came to fruition.⁵

The second community created was in Toccoa, Georgia and referred to as Tournapull, Georgia by Letourneau; he built houses, a large dammed lake, airport, training center, his own all-steel home and a Christian conference center in addition to the plant. The conference grounds and camp consisted of "The World's First All-Steel Hotel" which had seven wings radiating off of a central 100' diameter selfsupported steel dome of his own design.⁶ The Apart-Houses in Toccoa were small, simple and efficient houses of pressed steel panel construction. Different from the houses at the Peoria plant, the Apart-Houses were 12'x32' and built entirely within a jig; new embossed patterns were used as well. The walls were insulated with vermiculite and the appliances were integral to the humble 384sf house. Larger, more complex homes were also created with the goal of being "modern and attractive."⁷ Many visitors to the Letourneau development felt that they were "developing a new 'Utopia' to show the nation how a Christian ideal can become a concrete fact."⁸

Next, LeTourneau set his sights on Vicksburg, Mississippi. The site was selected for its proximity to the Mississippi River for the ability to ship large machinery with ease; railroad tracks also led directly into the plant from the main railroad. LeTourneau started the Vicksburg plant in the early 1940s and the first houses introduced were the small steel Apart-Houses shipped from the Georgia plant. Originally named Glass, Mississippi, LeTourneau renamed this community just south of Vicksburg "LeTourneau, Mississippi". The site would eventually grow to boast farms, a dairy, a general store, gas station, post office, fire department, tennis courts, a swimming pool called the "TournaPool" and a chapel; refer to Figure 5 for LeTourneau's cartoon-like drawing that reveals the daily activities of the

community. Chapel was an introduced part of daily life on site for the workers and was envisioned by LeTourneau as a lunchtime retreat.

LeTourneau's experimental concrete housing began in Vicksburg in early 1944 and was created to "Pour Post War Homes".⁹ Several curved forms were created with the intent of connecting the individual distinct forms as a kit of parts to create a whole. The idea, for the individual forms, was to be able to suit the needs to the homeowners and site. While several different forms were created, none of the separate forms were ever actually joined to finish a whole house; the curved concrete shells were 2-3" thick unreinforced concrete; the forms themselves provided the necessary structural strength without the use of steel.

The most complex form created was the 'Four Leaf Clover' as LeTourneau called it; those in the Letourneau community often referred to it as 'The Igloo', see Figure 2. Interestingly, LeTourneau perceived many of his communities through the aerial view as he owned several airplanes and often published aerial photos in his self-published newsletter *NOW*¹⁰; also refer to Figure 5 for "Bird's Eye View". He conceived the four leaf clover shape of this house in plan due to the fact that 'The Igloo' was immediately rejected by LeTourneau himself once the three dimensional structure was cast; he cited the hindrance and limitations of curvilinear walls with respect to furniture placement and overall organization of interior space. While experimenting with complex curved forms, LeTourneau was also experimenting with a simple rectilinear form but complex



Figure 2. The Clover aka the Igloo - Experimental concrete housing in Vicksburg, Mississippi. February 1944. Image courtesy of LeTourneau University Archives.

housing system that would be made by a new complex machine called the Tournalayer, see Figure 1.

During World War II, steel in the United States was used for essential machinery and considered inappropriate for housing, and concrete became the better choice. The Tournalayer was first created in 1944, and was a complex, 165-ton machine¹¹ that created a "house-a-day" with the assistance of a Tournacrane and Tournamixer.¹² While single-pour concrete houses existed at the beginning of the century, Letourneau exploited the idea of production by developing flexible reusable formwork that permitted openings in the shell to be located quickly while allowing the form itself to change in size. The Tournalayer could precisely place a house within a quarter of an inch.¹³ This kind of precision was necessary to create multi-storied houses as well as multicast houses.



Figure 3. The first Tournalaid house was poured in Vicksburg, Mississippi in November 1945. Image from the in-house publication NOW. March 15, 1946. Vol 10, No.44.

The second Tournalayer community established by Letourneau consisted of employee housing at the Longview, Texas LeTourneau plant. It began in 1946 with the introduction of Tournalayer No. 2 and the second Tournalaid community began with much fanfare; the first pouring of a Tournalaid house was met with cheerleaders, speeches and a 132-page Special Sunday Edition of the Longview Daily News. Several thousand people, including a senator, preachers, reporters and the Kilgore Rangerettes watched as the second Tournalayer poured the first house on what is now LeTourneau University. The dedication ceremony of LeTourneau Technical Insti-

tute of Texas simultaneously occurred on February 25, 1946 and the event provided an excellent opportunity to showcase LeTourneau's equipment.

THE CRAFTSMEN

While the concept of casting a "house in a day" was simple, the reality consisted of a complicated sequence of events requiring a trained group of craftsmen to successfully complete. The 1950 brochure "The Tournalayer and How It Works" defines the multiple processes and sequence of events that will need to occur to produce housing with the massive equipment.¹⁴

Now we must ask the question: What is the true goal of the craftsman? Is the goal about the machine or is it the end product? The activity of creating is not only the process of creating, but the end product as well. Henry Petroski makes the point clear with the example of the invention of the paperclip and the patented machine that made the original paper clip. With his focus on the machine for making the standard paperclip, the inventor William Middlebrook patented the machine in 1899, but neglected to patent the paperclip design itself.¹⁵ The inventor was so intensely focused on the machine that he lost sight of the end goal. He neglected the fact that there was more than one way to accomplish the same goal or the possibility that it could be accomplished more efficiently by other means.

The men that LeTourneau employed were the craftsmen who formed the Tournalayer; they directly influenced the end housing product and its form. In effect they were, with their new early 20th century tools, indirectly forming housing for themselves and their families. The quality in every aspect of their craft influenced the final product, their homes. At multiple scales, the final form of the house was influenced by the Tournalayer; from the individual weld marks to the overall moulds. Marco Frascari stated "The designer in the past could rely on the craftsmen to help solve the details, this is before the architect prepared the detail drawings. For builders there was no need for detailed drawings because details were simply common knowledge."¹⁶

The craftsman's skill with their material of choice was key. The direct knowledge of how the materials would act and perform was closely tied to the craftsman and their abilities. Direct knowledge and

contact with the materials through repetitive work allowed the craftsman to know how the materials would behave with the use of specific tools. The welder as craftsman relied little on detail drawings. The first several Tournalayers evolved as the new homes were created. A feedback loop was established that improved the machine, and therefore the house as product. Paul Ricoeur notes that history is also the history of the plurality of men; that is to say not only of individuals, but also the communities and civilizations.¹⁷ The Tournalaid community was created and experienced by the men who created it. A strength and pride of community was forged.

The hand and mind are so closely connected that when making removes the hand, the mind can become isolated. Richard Sennett writes: "Making is thinking"; the craftsman's mind will suffer when the hand and mind are separated and that both understanding and expression are impaired.¹⁸ The artist and craftsman controlling the machine as a creative tool have been contemplated for the entire twentieth century. Frank Lloyd Wright wrote: "Not one educational institution in America has as yet attempted to forge the connecting link between science and art by training the artist to his actual tools, or, by a process of nature-study that develops in him power of independent thought, fitting him to use them properly."¹⁹ This foresight still rings true and serves as a reminder that the craftsman has a responsibility to visualize the end product to be created. The responsibility of the craftsman is to create and know their tools as well as to understand their consequences and potential simultaneously.

While multiplicity in housing has been noted as a cause for the lacking of complexity, it does afford the potential for tuning the spaces after repetition and time. This is deeply related to both prefabrication and architectural design. While speaking at a real estate convention in 1932, Wright spoke of the significance of how to use the machine and his plans for an "assembled house." He said, "The house itself is going to take on some of the characteristics that Henry's Model-T took on when it was in Henry's hands, when it was in the inventor's hands. An inventor is not an architect." He also went on to state that there was no reason why the assembled house, fabricated in the factory, should not be made as beautiful and as efficient as the modern automobile in which there was a new simplicity, "a machine-made simplicity."²⁰

Early in the 20th century in the United States, the need for immediate family housing was great and Americans were accepting of new manufacturing solutions because the new inventions were improving everyday life at the touch of a button. The new inventions represented hope, and machines were the solution. Understanding how the machines are physically made might be straight forward, but understanding why they were created in a specific way is an historical question. As Hans-Georg Gadamer wrote, "it is precisely the task of an historical hermeneutics to consider the tension that exists between the identity of the common object and the changing situation in which it must be understood."²¹ The design challenge of prefabricated housing interested many architects in the modern era, however, the reward came from the intellectual challenge inherent in the design itself rather than with its ultimate realization.²² Architects and manufacturers of the machines and housing systems did not always work together to create the end product of the house. The *how* and the *why* were often separated. The hand and the mind were disconnected.

The period of the 1940s-60s required new ways of thinking about modernity and human dwelling. New experiments in housing and communities were undertaken. Efficient use of materials, flexible spaces, carefree and durable materials, as well as new inventions to lessen labor in the home were all being introduced. LeTourneau's Tournalayer had less of a contribution to the actual design of houses, yet provided a viable theoretical framework for individual designers and architects to work within. Many different designers and architects over time were employed to work with the Tournalayer and to site the many different communities. While it might appear that a standard machine will output a repeated series of identical houses, the Tournalayer was used to create many different communities, each with very different character. The Tournalayer was employed as a tool to create the form of the individual house, but the designers for each community tailored the houses to fit within the local context.

While making a tool to make a thing, a craftsman must focus not only on the tool that is at hand, but they must project its intended consequence upon the materials that the tool is to come into contact with and help form. Martin Heidegger speaks of *enframing* as a revealing in conjunction with the technological parts of an assembly. He uses the

example of engine components. Putting the components of the assembly into an order will go beyond *enframing* to encompass technological activity.²³ Ordering and assembling the parts of a whole are influenced by a person's way of thinking at a specific point in time. Simply existing in a different historical time and context allows for new or different human activity to influence the outcome. This sense of historicity allows for a new reading of the technology of the past. The architectural context allows for the reading of the craftsmen's thoughts of the past. The evolution of the Tournalayer speaks to the need for efficiency. While the first Tournalayer looked much the same as the later Tournalayers, the architectural context that drove the machine in each construction case changed extensively over the years.

THE HOPE FOR THE MACHINE

Many communities were established using the Tournalayer. While Vicksburg, Mississippi (See Figure 4) was the first, there were many more including: Longview, Texas; Muroc, California; Yuma, Arizona; Corpus Christi, Texas; Los Angeles, California; Sao Paulo, Brazil; Toccoa, Georgia; Beer Sheva, Israel; French, Morocco and Monrovia, Liberia. Not all of the Tournalaid communities have been located at the time of this paper. Looking at how these Tournalaid communities evolved sheds light onto the thoughts of the people at the time. There was hope that man's inventions would help to create the modern home and give man more time for leisure and contemplation.

Prefabrication in construction was a solution that allowed for speed. Architects, designers and manufacturers were all developing new ideas about how



Figure 4. Mural Title: R. G. LeTourneau Industries: Building an Industry and God's Kingdom. Dedicated: May 14, 2009. Artist Robert Dafford.

to construct the new American home. Early in the 20th century new tools were being developed at a staggering pace. *New* was the goal; *new itself* was accepted automatically as being better. While the design of the spaces in these houses was certainly considered, the speed at which the houses could be constructed was driving the initiative. The Tournalayer housing construction spanned over twenty years. The later housing began to take on more control than the earlier forms, due to the experience through repetition and the established feedback loop. While the Tournalayer was highly capable of repetition, there was continuous striving to retune the final design and create variety within each community. Many later designs incorporated more traditional craftsmanship in conjunction with the base Tournalaid form. The feedback loop enabled the craftsman to tune their skills and therefore direct their *knowing* of the machine and its potential.

There are many paradoxes of the prefabricated house, such as "its commercial ubiquity on one hand and its failure as a utopian idea on the other; the fascination it has held for modernism's leading protagonists; and the role it has played in determining relations between invention and production in modernity."²⁴ The Tournalayer was an industrial solution to American housing during and after World War II. While the house construction process is relatively easy to comprehend, how these houses helped define the American communities deserves further historical study. The most significant contribution made by LeTourneau was his ability to introduce hope into the American culture in the 1940s. Perhaps his invention planted a seed for the consistent interest and exploration of prefabricated housing.

Machines will not instantly create architecture without sensitive thought from an architect. The architect should look toward the positive attributes that technology and the machine has to offer. Designers as craftsmen of the machines "through the pondering of the silversmith" in Heidegger's sense,²⁵ have an influence on the final product that will be produced. Seemingly contradictory values can be merged to strengthen architecture and add worth to what the architect designs, what the craftsman creates and the resulting product that the machine produces. If the Tournalayer house can be seen as the first of many renditions of an economical but "carefree" prefabricated home, then it is the opportunity of the architect to take the tool to the next level.

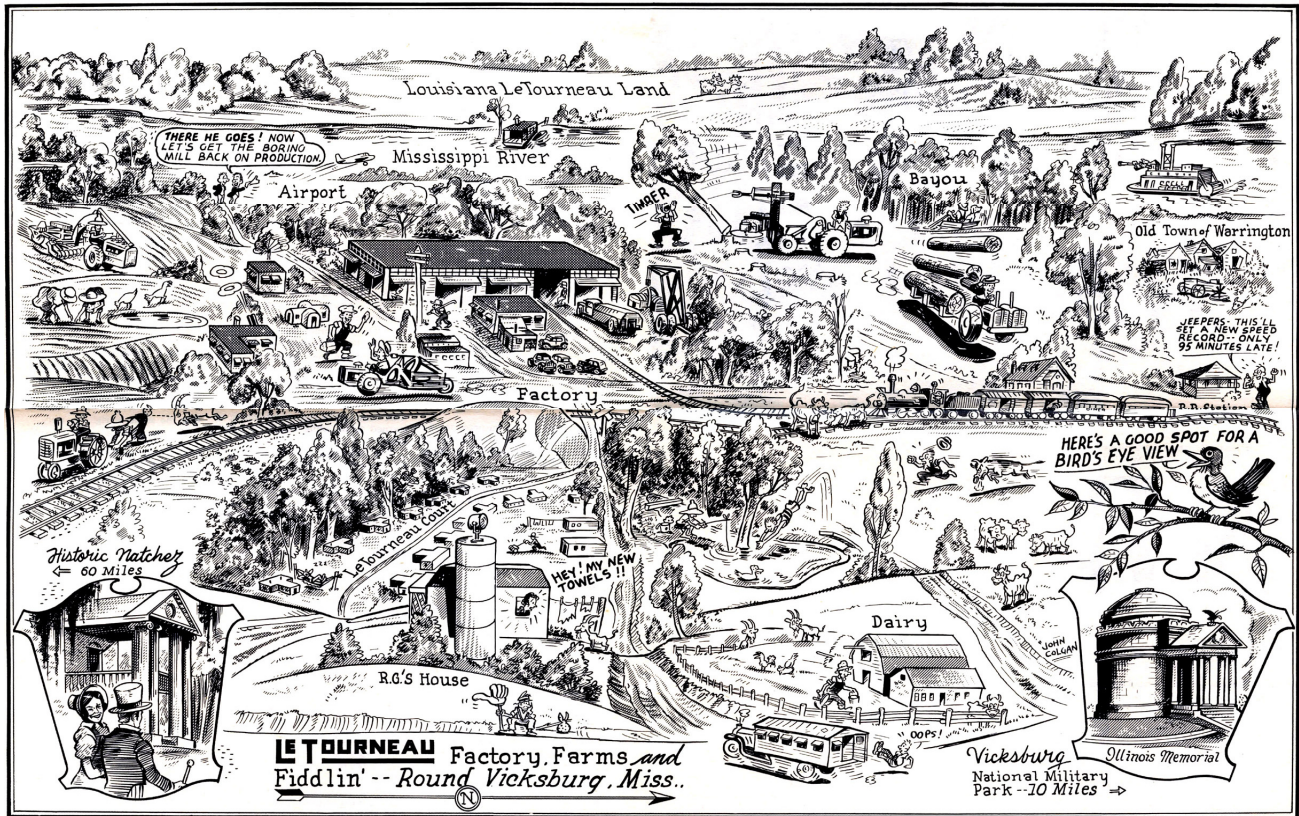


Figure 5. From the in-house publication NOW September 1, 1944. Vol.9, No.16. Caption: LeTourneau at Vicksburg.

ENDNOTES

1 The Letourneau steel house communities were in Peoria, Illinois (1936-1940) and Toccoa, Georgia (1940-). The Tournalayer/Tournalaid communities that have been identified at the time of this paper are Vicksburg, Mississippi (1944-1990); Longview, Texas (1945-); Muroc, California – Edwards Air Force Base (1947-2008); Yuma, Arizona (1948-); Corpus Christi, Texas (circa 1949-); Los Angeles, California (circa 1949-); Sao Paulo, Brazil (1947-); Toccoa, Georgia "Atomic Bomb-Proof Tourist Court" with Baby-Tournalayer (1951-); Beer Sheva, Israel (1947-); Monrovia, Liberia (1953-), and French Morocco (1950-).

2 NOW, November 26, 1937 Volume 2 No.27, Caption "Air Sketch of Magnetic All Steel Colony"

3 NOW, September 29, 1939 Volume 4 No.19, Caption "LeTourneau Court 1938-1939"

4 Efraim Fields worked with LeTourneau to design the steel panel houses.

5 NOW, September 29, 1939 Volume 4 No.19, Caption "LeTourneau Court 1938-1939"

6 In 1954 a 300' diameter self supported prefabricated aluminum dome was designed and built in Longview, Texas for use as a portable tabernacle; it was called the Billy Graham Tabernacle at the time. The intent was for the tabernacle to be moved from city to city.

7 Albert Lorimer, *God Runs My Business: The*

Story of R.G. LeTourneau (New York: Revell, 1941), 96, 8 Ibid.

9 NOW, February 18, 1944 Vol.8 No. 40

10 The name of LeTourneau's self-publication NOW is derived from 2 Corinthians 6:2 "Behold, NOW is the accepted time; behold NOW is the day for salvation." Note: NOW emphasis is LeTourneau's.

11 R.G. LeTourneau, *Mover of Men and Mountains: Autobiography*. (Englewood Cliffs, N.J.: Prentice-Hall, 1960), 202. Note: There is reference, in this autobiography, that "Bob" LeTourneau's name changed to "R.G." LeTourneau due to his "Rube Goldberg-like" machines.

12 "Bungalo Biddy: R. G. Letourneau's 165-Ton Gadget Lays One Concrete House Per Day," *LIFE* (March 11, 1946): 47-50.

13 Efraim Margolin phone interview by author on 2010-07-01. Efraim spent several weeks at the LeTourneau Plant in Longview, Texas in 1947 learning how the Tournalayer worked. He then returned to Beer Sheva, Israel with the Tournalayer system. He was in charge of the equipment and the construction of the many two-story Tournalaid houses that established the city of Beer Sheva. Efraim published his memoir *Building Dreams: My Heart Belongs to Israel* early in 2010 many accounts of the equipment and the establishing of the town in Israel are mentioned.

14 Several Tournalayer pamphlets are located within the LeTourneau University Archives; the brochures

show how the system works and show the benefits of the system. The brochures target the end clients as well as contractors.

15 Henry Petroski, *The Evolution of Useful Things* (New York: Knopf, 1993), 69.

16 Marco Francari, "The Tell-the-Tale Detail," *Via* 7 (1996): 25.

17 Paul Ricoeur, *History and Truth*, trans. & intro. by Charles A. Kelbley (Evanston: Northwestern University Press, 1965), 74.

18 Richard Sennett, *The Craftsman* (New Haven: Yale University Press, 2008), 20.

19 Frank Lloyd Wright, "The Art and Craft of the Machine," *Brush and Pencil*, no. 2 (May 1901): 89.

20 Frank Lloyd Wright, "The House of the Future," *Frank Lloyd Wright Collected Writings*, v. 3 (New York: Rizzoli, 1992), 123.

21 Hans-Georg Gadamer, *Truth and Method*, trans. by Joel Weinsheimer & Donald G. Marshall (New York: Seabury Press, 1975), 276.

22 Gilbert Herbert, *The Dream of the Factory-Made House: Walter Gropius and Konrad Wachsmann* (Cambridge: MIT Press, 1984), 6.

23 Martin Heidegger, *The Question Concerning Technology, and Other Essays* (New York: Harper & Row, 1977), 21.

24 Barry Bergdoll and et al., *Home Delivery: Fabricating the Modern Dwelling* (New York: Museum of Modern Art, 2008), 7.

25 Martin Heidegger, *The Question Concerning Technology, and Other Essays* (New York: Harper & Row, 1977), 8.